Am

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/086,544	03/04/2002	Yutaka Arima	08372.0007	2264

7590 01/19/2005

EXAMINER	
HIRL, JOSEPH P	

Finnegan, Henderson, Farabow,
Garrett & Dunner, L.L.P.
1300 I Street, N.W.
Washington, DC 20005-3315

ART UNIT	PAPER NUMBER
2121	

DATE MAILED: 01/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/086,544	ARIMA, YUTAKA
	Examiner	Art Unit
	Joseph P. Hirl	2121

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 November 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *04 June 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *011305*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

1. This Office Action is in response to an AMENDMENT entered November 5, 2004 for the patent application 10/086,544 filed on March 4, 2002.

2. The First Office Action of July 7, 2004 is fully incorporated into this Final Office Action by reference.

Status of Claims

3. Claims 1, 5, and 8-11 are amended. Claims 1-13 are pending.

Request for Information

4. In accordance with 37 C.F.R. 1.105, please provide all related information concerning the material cited in the IDS of June 4, 2002. Specifically each of the IDS documents must be fully translated since each document bears significantly on the disclosed invention. Further, all related documents such as those cited in the IDS documents (i.e. Ch 3, pg 2 re "Chapters 4-6 associative performance") of whatever media including published dates or dates related to briefings to others should be provided in a translated to English form.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Para 10 below applies to the examination.

6. Claims 1-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Study of Associative Memory Analog Neural Network LSI with Learning Function (SAMANN) in view of Chaos and Associative Memory (CAM) (Yutaka Arima, Higher Integration of Neural Network with Learning Function, Study of Associative Memory Analog Neural Network LSI with Learning Function, referred to as **SAMANN**; Chaos and Associative Memory, referred to as **CAM**).

Claim 1

SAMANN teaches an associative memory-based computer, comprising at least one associative memory (**SAMANN – current translation (ct)**, p 1, l 12); a plurality of associative data memories capable of temporarily holding input or output data of said associative memory (**SAMANN – (ct)**, p 1, l 16-23; Examiner's Note (EN): generic definition of an associative neural network); and a value judgment device receiving part of the data held in said plurality of associative data memories (**SAMANN– (ct)**, p 1, l 19-20; EN: logic gate is a value judgment device).

Claim 2

SAMANN does not teach associative memory is formed of a chaotic neural network. CAM does teach associative memory is formed of a chaotic neural network (**CAM**, page 3). It would have been obvious to one of ordinary skill in the art at the time of the invention to create a chaotic neural network by taking a dynamic system which has a dense collection of periodic points, is sensitivity to the initial conditions and is topological transitive and make adjustments internal to the neural network and the coupling coefficients. The modification would have been obvious because one of ordinary skill in the art would have been motivated to seek improved functionality by simulating biological models.

Claim 3

SAMANN teaches a function to modulate a threshold value of a neuron forming the associative data in accordance with a fired frequency of the relevant neuron (**SAMANN**, Fig. 3.1; EN: Vref is a threshold value; attribute data is frequency data; Fig. 3.1 is an associative neuron).

Claim 4

SAMANN teaches wherein the modulation is carried out by decreasing the threshold value of the neuron in proportion to the fired frequency thereof (**SAMANN**, Fig. 3.3; EN: Vdd can be adjusted) .

Claim 5

SAMANN teaches associative data memories include a first associative data

memory sending and receiving data directly to and from said associative memory, and a plurality of second associative data memories sending and receiving data to and from said associative memory via said first associative data memory (**SAMANN**, Fig. 3.2; EN: inputs and outputs of the synaptic circuit).

Claim 6

SAMANN teaches a function to modulate a threshold value of a neuron forming the associative data in accordance with a fired frequency of the relevant neuron (**SAMANN**, Fig. 3.2; EN: binary function which is either on or off).

Claim 7

SAMANN teaches the modulation is carried out by decreasing the threshold value of the neuron in proportion to the fired frequency thereof (**SAMANN**, Fig. 3.2; EN: binary function which is either on or off; going from on to off is decreasing the threshold value).

Claim 8

SAMANN teaches value judgment device receives part of the data in said first associative data memory to evaluate whether an output result associated in the associative memory conforms with a preconfigured purpose (**SAMANN**, Fig. 3.2; EN: output set in reference to Vdd); and an output signal of said value judgment device is used for control of whether to transfer the associative data held in said first associative data memory to said plurality of second associative data memories (**SAMANN**, Fig. 3.2; EN: state input of neuron i achieves flow; Vdd sets value for judgment).

Claim 9

SAMANN teaches said value judgment device receives part of the data in said plurality of second associative data memories to evaluate whether a plurality of pieces of associative data held in said plurality of second associative data memories are consistent with each other (**SAMANN**, Fig. 3.2; EN: the capacitor is the value judgment device and consistency is determined by the voltage accumulated across C1); and an output signal from said value judgment device is used for control of whether to transfer the associative data held in said second associative data memories to said first associative data memory (**SAMANN**, Fig. 3.2; EN: if the output signal from C1 is not of sufficient value, no data will transfer).

Claim 10

SAMANN does teach a plurality of second associative data memories connected to said first associative data memory and having a function to hold a plurality of patterns of the symbol pattern on said first associative data memory as required (**SAMANN**, Fig. 3.2; EN: a grouping of secondary associative data memories will support the storing of patterns); a first value judgment device receiving some of the signals of said first associative data memory and outputting a signal for determining whether the pattern on said first associative data memory is worth holding on said second associative data memory (**SAMANN**, Fig. 3.2; EN: value will be outputted if threshold is exceeded at C1); and a second value judgment device receiving part of the data within said second associative data memories and having a function to determine whether the plurality of symbol patterns held in said second associative data memories are consistent with

each other (**SAMANN**, Fig. 3.2; EN: a second Synaptic Circuit will have another threshold to which a comparison can be made).

SAMANN does not teach a chaotic associative memory including a raw neuron group as collection of raw neurons interacting with the outside world and a symbol neuron group as a collection of symbol neurons serving as information processors within the computer. CAM teaches a chaotic associative memory including a raw neuron group as collection of raw neurons interacting with the outside world and a symbol neuron group as a collection of symbol neurons serving as information processors within the computer (**CAM**, page 3). It would have been obvious to one of ordinary skill in the art at the time of the invention to create a chaotic neural network by assembly of neurons with inputs. The modification would have been obvious because one of ordinary skill in the art would have been motivated to seek improved functionality through assembly of simulated biological models.

SAMANN does not teach a first associative data memory directly connected to the symbol neuron group of said chaotic associative memory and having a function to temporarily hold a symbol pattern represented by states of neuron signals of said symbol neuron group. CAM teaches a first associative data memory directly connected to the symbol neuron group of said chaotic associative memory and having a function to temporarily hold a symbol pattern represented by states of neuron signals of said symbol neuron group (**CAM**, page 2; page 4, lines 1-4; Fig 2). It would have been obvious to one of ordinary skill in the art at the time of the invention to create storage related to processed data or symbols. The modification would have been obvious

because one of ordinary skill in the art would have been motivated to seek processing by storing t-1 values.

Claim 11

SAMANN does teach a working memory portion including a symbol stage having a function to temporarily store and hold said common symbol pattern, all said specific symbol patterns and a state pattern from said associative memory portion and also having a function to temporally integrate an activation value for each symbol neuron to modulate its fining threshold value in accordance with the integral, a plurality of working memories having a function to hold pattern information held in said symbol stage for a prescribed period of time, and a control sequencer generating a state pattern signal for use in defining directivity of association, invalidation of each input information, invalidation of each associative output, or directivity of each symbol signal in accordance with an external object signal and applying the generated signal commonly to said associative memories (**SAMANN**, page 1, lines 13-28; page 2, lines 1-26; Fig. 3.1; EN: external signal IselS functions as a control sequencer); and a value judgment network portion including a result determination network receiving at least a portion of the pattern signals of said symbol stage in said working memory portion and having a function to evaluate at least whether a result associated in said associative memory portion conforms with a preconfigured purpose and thus to determine whether to newly transfer the symbol pattern held to said working memory, and a consistency determination network receiving some of the pattern signals from said working memories and having a function to determine whether a plurality of symbol patterns

held in said working memories are consistent with each other, and, according to the value evaluation, to cause a control sequence to develop into an actual operation (**SAMANN**, page 1, lines 13-28; page 2, lines 1-26; page 3, lines 11-14; Fig. 3.1; EN: Vref and related comparator function as a value judgment network; external signal IselS functions as a control sequencer; learning is synonymous with consistency determination network); each said symbol neuron group including, between itself and said working memory portion, a portion where a state pattern signal common to all the memories is input, a portion. where a common symbol pattern is input/output, and a portion where a specific symbol pattern for each memory is input/output (**SAMANN**, page 1, lines 13-28; page 2, lines 1-26; Fig. 3.1; EN: to one of ordinary skill in the art, all neural networks have a network of neurons wherein some neurons act as input and some act as output); said plurality of working memories having a function to have values indicating the degrees of validity for information held in respective said working memories, the degree of validity having a mechanism to be attenuated with a certain time constant and at the same time to be increased or decreased by a prescribed amount in accordance with a condition of said control sequence (**SAMANN**, page 1, lines 13-28; Figs. 3.1, 3.2; EN: degree of activation is represented by the weighting factor; attenuation occurs in the synaptic load circuit; time constant is related to pulse characteristics, i.e. pulse width and frequency); and each of said result determination network and said consistency determination network being formed with a hierarchy-type neural network having a function to improve a value judgment capability through learning, and value signals as outputs from said result determination network and said

consistency determination network being applied to the control sequencer in said working memory portion (**SAMANN**, page 1, lines 13-28; page 2, lines 1-26; page 3, lines 11-14; Fig. 3.1; EN: Vref and related comparator function as a value judgment network; external signal IselS functions as a control sequencer; learning is synonymous with consistency determination network; neural networks are inherently hierarchical).

SAMANN does not teach chaotic associative memory having a symbol neuron group and a raw neuron group connected with raw pattern signal inputs from sensory organs and raw pattern signal outputs to muscles to implement an interface with the outside world, and relating a raw pattern from various sensory organs to an abstractive, specific symbol pattern formed based on a common symbol pattern through learning to implement complicated association including correlation between the chaotic associative memories. CAM teaches chaotic associative memory having a symbol neuron group and a raw neuron group connected with raw pattern signal inputs from sensory organs and raw pattern signal outputs to muscles to implement an interface with the outside world, and relating a raw pattern from various sensory organs to an abstractive, specific symbol pattern formed based on a common symbol pattern through learning to implement complicated association including correlation between the chaotic associative memories (**CAM**, page 3; EN: equations record abstract concepts). It would have been obvious to one of ordinary skill in the art at the time of the invention to create a chaotic neural network by taking a dynamic system which has a dense collection of periodic points, is sensitivity to the initial conditions and is topological transitive and make adjustments internal to the neural network and the coupling coefficients. The

modification would have been obvious because one of ordinary skill in the art would have been motivated to seek improved functionality by simulating biological models wherein, as an example, an input vector of four independent variables relates to a dependent variable of two variables.

Claim 12

SAMANN teaches directivity of association indicates whether to abstract or objectify said association (**SAMANN**, page 2, lines 9-11; EN: abstract is associated with internal active value and objectify is associated teacher data).

Claim 13

SAMANN does not teaches directivity of each symbol signal indicates whether said common symbol pattern is an input; or output with respect to each said chaotic associative memory. CAM teaches directivity of each symbol signal indicates whether said common symbol pattern is an input; or output with respect to each said chaotic associative memory (**CAM**, page 3; EN: content and directivity are synonymous). It would have been obvious to one of ordinary skill in the art at the time of the invention to create a chaotic neural network by taking a dynamic system which has a dense collection of periodic points, is sensitivity to the initial conditions and is topological transitive and make adjustments internal to the neural network and the coupling coefficients. The modification would have been obvious because one of ordinary skill in the art would have been motivated to seek improved functionality by simulating biological models and the input is distinctive from the output by its characteristic vector, i.e. 4 independent variables for an input and three dependent variables for an output.

Response to Arguments

7. The response to the request for information is incomplete. The request for information remains as stated in the First Office Action and restated above.

8. The objection to the specification is withdrawn.

9. The rejection of claims 8, 10, and 11 under 35 USC 112, second paragraph, is withdrawn.

10. Applicant's arguments filed on November 5, 2004 related to Claims 1-13 rejected under 35 USC 103 have been fully considered but are not persuasive.

In reference to Applicant's argument:

The Office Action sets forth many characterizations of the cited references. Applicant discusses selected ones of these characterizations in this Reply. However, the lack of discussion does not indicate that Applicant agrees with the characterizations set forth in the Office Action.

Examiner's response:

MPEP 714.02 requires full and timely response to "every ground of objection and rejection in the prior office action."

In reference to Applicant's argument:

SAMANN fails to teach or suggest at least this following elements of claim 1: "a plurality of associative data memories capable of temporarily holding input or output data of said associative memory; and a value judgment device receiving part of the data held in said plurality of associative data memories."

The Office Action describes the elements listed in claim 1 as a Markush group and refers to a passage in SAMANN as disclosing "one example of prior art referenced to one of the cited group." See Office Action, page 4. However, claim 1 does not recite a Markush group and has been amended to address the Office Action's contrary interpretation.

Examiner's response:

In artificial neural networks that play the role of associative memory, data is collectively stored in the form of a memory or weight matrix, which is used to generate the output that should correspond to a given input. The process of developing the

weight matrix is referred to as learning or storing the desired patterns, while retrieval or recall refers to the generation of an output pattern when an input pattern is presented to the network. Related to "a plurality of associative data memories capable of temporarily holding input or output data of said associative memory; and a value judgment device receiving part of the data held in said plurality of associative data memories" the now provided translation of SAMANN @ p1, l 16-23 pertains. The Markush rejection was addressed in the First Office Action prior to the current amendment.

In reference to Applicant's argument:

The Office Action describes CAM as teaching the following elements of claim 10: a first associative data memory directly connected to the symbol neuron group of said chaotic associative memory and having a function to temporarily hold a symbol pattern represented by states of neuron signals of said symbol neuron group." See Office Action, page 8. In making this rejection, the Office Action refers to page 2, page 4, lines 1-4, and Figure 2 of CAM. These passages appear to describe a chaotic associative memory neural network. However, CAM fails to describe this chaotic associative memory neural network as being "connected to the symbol neuron group of said chaotic associative memory and having a function to temporarily hold a symbol pattern represented by states of neuron signals of said symbol neuron group," as claimed.

Examiner's response:

In artificial neural networks that play the role of associative memory, data is collectively stored in the form of a memory or weight matrix, which is used to generate the output that should correspond to a given input. The process of developing the weight matrix is referred to as learning or storing the desired patterns, while retrieval or recall refers to the generation of an output pattern when an input pattern is presented to the network. This process is generic to artificial neural networks that play the role of associative memory. Hence being "connected to the symbol neuron group of said chaotic associative memory and having a function to temporarily hold a symbol pattern

represented by states of neuron signals of said symbol neuron group" is nothing more that a garden variety associative neural network that is well known to those skilled in the art.

In reference to Applicant's argument:

The passages recited from SAMANN appear to describe how to configure a neuron circuit in an associative memory neural network. SAMANN describes the IselS signal of the neuron circuit as "a select/control signal determining whether to fix the output state of the neuron with the teacher data or to let it take the state attributable to the internal active value." See SAMANN at page 6, lines 12-15. SAMANN also gives examples of how the neuron circuit functions in response to the IselS signal. See Table 3.1 of SAMANN at page 8. These passages fail to explain how the IselS signal operates as: "a control sequencer generating a state pattern signal for use in defining directivity of association, invalidation of each input information, invalidation of each associative output, or directivity of each symbol signal in accordance with an external object signal and applying the generated signal commonly to said associative memories," as claimed.

Examiner's response:

Para 13. applies. In artificial neural networks that play the role of associative memory, data is collectively stored in the form of a memory or weight matrix, which is used to generate the output that should correspond to a given input. The process of developing the weight matrix is referred to as learning or storing the desired patterns, while retrieval or recall refers to the generation of an output pattern when an input pattern is presented to the network. This process is generic to artificial neural networks that play the role of associative memory. From the currently provided translation of SAMANN @ p 6, l 12-15, "More specifically, control signal IselS is a select/control signal determining whether to fix the output state of the neuron with the teacher data or to let it take the state attribute to the internal active value." Obviously IselS is a control signal and therefore a control sequencer. Because IselS selects "teacher" or "internal", it is defining directivity of association ... and the related invalidations or directivity ... related

to each external signal as the reference indicates ... and applying it commonly to the associated memories ... again as stated in the currently provided translation.

In reference to Applicant's argument:

These passages correspond to page 5, line 14, through page 6, and Figure 3.1 of the full translation of SAMANN, attached in the accompanying Supplemental IDS.

Examiner's response:

The full translation as requested in the First Office Action has not been provided. Chapters 4-6 have yet to be provided (SAMANN, initial IDS @ p 2, l 3).

Examination Considerations

11. The claims and only the claims form the metes and bounds of the invention. "Office personnel are to give the claims their broadest reasonable interpretation in light of the supporting disclosure. *In re Morris,* 127 F.3d 1048, 1054-55, 44USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Limitations appearing in the specification but not recited in the claim are not read into the claim. *In re Prater*, 415 F.2d, 1393, 1404-05, 162 USPQ 541, 550-551 (CCPA 1969)" (MPEP p 2100-8, c 2, l 45-48; p 2100-9, c 1, l 1-4). The Examiner has full latitude to interpret each claim in the broadest reasonable sense. Examiner will reference prior art using terminology familiar to one of ordinary skill in the art. Such an approach is broad in concept and can be either explicit or implicit in meaning.

12. Examiner's Notes are provided to assist the applicant to better understand the nature of the prior art, application of such prior art and, as appropriate, to further indicate other prior art that maybe applied in other office actions. Such comments are entirely consistent with the intent and spirit of compact prosecution. However, and unless otherwise stated, the Examiner's Notes are not prior art but a link to prior art that one of ordinary skill in the art would find inherently appropriate.

13. Examiner's Opinion: Paras 11. and 12. apply. The Examiner has full latitude to interpret each claim in the broadest reasonable sense.

Conclusion

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

15. Claims 1-13 are rejected.

Correspondence Information

16. Any inquiry concerning this information or related to the subject disclosure should be directed to the Examiner, Joseph P. Hirl, whose telephone number is (571) 272-3685. The Examiner can be reached on Monday – Thursday from 6:00 a.m. to 4:30 p.m.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Anthony Knight can be reached at (571) 272-3687.

Any response to this office action should be mailed to:

Commissioner of Patents and Trademarks,

Washington, D. C. 20231;

or faxed to:

(703) 872-9306 (for formal communications intended for entry);

or faxed to:

(571) 273-3685 (for informal or draft communications with notation of "Proposed" or "Draft" for the desk of the Examiner).

Joseph P. Hirl, (January 13, 2005)